

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problems Mailbox.**



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification <sup>5</sup> : A61K 31/00, 31/475, 31/40</p>	<p>A2</p>	<p>(11) International Publication Number: WO 94/25012 (43) International Publication Date: 10 November 1994 (10.11.94)</p>
<p>(21) International Application Number: PCT/EP94/01240 (22) International Filing Date: 20 April 1994 (20.04.94) (30) Priority Data: 9308802.9 28 April 1993 (28.04.93) GB (71) Applicant (for all designated States except US): SMITHKLINE BEECHAM PLC [GB/GB]; New Horizons Court, Brentford, Middlesex TW8 9EP (GB). (72) Inventors; and (75) Inventors/Applicants (for US only): BLACKBURN, Thomas, Paul [GB/GB]; SmithKline Beecham Pharmaceuticals, Coldharbour Road, The Pinnacles, Harlow, Essex CM19 5AD (GB). KENNETT, Guy, Anthony [GB/GB]; SmithKline Beecham Pharmaceuticals, Coldharbour Road, The Pinnacles, Harlow, Essex CM19 5AD (GB). BAXTER, Gordon, Smith [GB/GB]; SmithKline Beecham Pharmaceuticals, Coldharbour Road, The Pinnacles, Harlow, Essex CM19 5AD (GB). (74) Agent: GIDDINGS, Peter, J.; Corporate Intellectual Property, SmithKline Beecham, Mundells, Welwyn Garden City, Hertfordshire AL7 1EY (GB).</p>	<p>(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, GE, HU, JP, KG, KP, KR, KZ, LK, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published Without international search report and to be republished upon receipt of that report.</p>	
<p>(54) Title: MEDICAMENTS FOR TREATMENT OF MIGRAINE, EPILEPSY AND FEEDING DISORDERS</p>		
<p>(57) Abstract</p> <p>A novel method of medical treatment, in particular the treatment and prevention of epilepsy and migraine.</p>		

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	GB	United Kingdom	MR	Mauritania
AU	Australia	GE	Georgia	MW	Malawi
BB	Barbados	GN	Guinea	NE	Niger
BE	Belgium	GR	Greece	NL	Netherlands
BF	Burkina Faso	HU	Hungary	NO	Norway
BG	Bulgaria	IE	Ireland	NZ	New Zealand
BJ	Benin	IT	Italy	PL	Poland
BR	Brazil	JP	Japan	PT	Portugal
BY	Belarus	KE	Kenya	RO	Romania
CA	Canada	KG	Kyrgyzstan	RU	Russian Federation
CF	Central African Republic	KP	Democratic People's Republic of Korea	SD	Sudan
CG	Congo	KR	Republic of Korea	SE	Sweden
CH	Switzerland	KZ	Kazakhstan	SI	Slovenia
CI	Côte d'Ivoire	LI	Liechtenstein	SK	Slovakia
CM	Cameroon	LT	Lithuania	SN	Senegal
CN	China	LK	Sri Lanka	TD	Chad
CS	Czechoslovakia	LU	Luxembourg	TG	Togo
CZ	Czech Republic	LV	Latvia	TJ	Tajikistan
DE	Germany	MC	Monaco	TT	Trinidad and Tobago
DK	Denmark	MD	Republic of Moldova	UA	Ukraine
ES	Spain	MG	Madagascar	US	United States of America
FI	Finland	ML	Mali	UZ	Uzbekistan
FR	France	MN	Mongolia	VN	Viet Nam
GA	Gabon				

**MEDICAMENTS FOR TREATMENT OF MIGRAINE, EPILEPSY AND  
FEEDING DISORDERS**

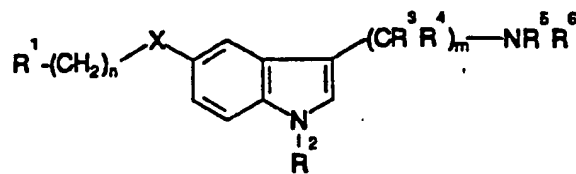
The present invention relates to a novel method of medical treatment, in particular the treatment and prevention of epilepsy and migraine.

5        Compounds which have activity as 5HT<sub>2C</sub> receptor antagonists and activity at the rat fundus serotonin receptor are known in the art. Examples of such compounds are disclosed in WO 93/18028 and WO 92/05170.

10        Rat fundus serotonin receptors are presently known as 5HT<sub>2B</sub> receptors. It has now been found that these 5HT<sub>2B</sub> receptors are located in regions of the brain, for example in the hippocampus, habenula and hypothalamus regions. It is expected, as a consequence, that compounds which exhibit 5HT<sub>2B</sub> receptor modulating activity will be of use in the treatment of certain CNS disorders, in particular epilepsy, migraine and feeding disorders. It has also been found that these 5HT<sub>2B</sub> receptors are located in the gastrointestinal tract. Compounds which exhibit 5HT<sub>2B</sub> receptor modulating activity are  
15        therefore also expected to be of use in the treatment of GI disorders such as irritable bowel syndrome (IBS).

20        The present invention therefore provides, in a first aspect, the use of a 5HT<sub>2B</sub> receptor modulator in the treatment of epilepsy, migraine and feeding disorders. It will be appreciated by those skilled in the art that the term '5HT<sub>2B</sub> receptor modulator' refers to a compound which acts as an agonist or antagonist at the 5HT<sub>2B</sub> receptor.

25        In particular, for the treatment or prophylaxis of epilepsy and feeding disorders such as anorexia nervosa, the 5HT<sub>2B</sub> receptor modulator should preferably be a 5HT<sub>2B</sub> receptor agonist. Preferred 5HT<sub>2B</sub> receptor agonists include compounds of formula (I) and pharmaceutically acceptable salts thereof:



(I)

30        in which

R<sup>1</sup> is an optionally substituted phenyl, thienyl or furyl ring;

R<sup>2</sup> is hydrogen or C<sub>1-6</sub> alkyl;

R<sup>3</sup> and R<sup>4</sup> are independently hydrogen or C<sub>1-6</sub> alkyl;

R<sup>5</sup> and R<sup>6</sup> are independently hydrogen or C<sub>1-6</sub> alkyl;

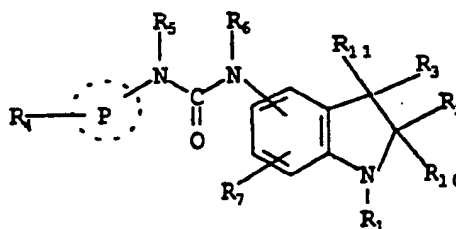
X is O, S or NH; and  
n and m are independently 1 or 2.

A particularly preferred 5HT<sub>2B</sub> receptor agonist of formula (I) is 1-(5-(2-thienylmethoxy)-1H-indol-3-yl)propan-2-amine.

5 For the treatment or prophylaxis of migraine and IBS the 5HT<sub>2B</sub> receptor modulator should preferably be a 5HT<sub>2B</sub> receptor antagonist.

Preferred 5HT<sub>2B</sub> receptor antagonist compounds expected to be useful in the above treatments include those of formula (IA) or pharmaceutically acceptable salts thereof:

10



(IA)

wherein:

15 P represents a quinoline or isoquinoline residue or a 5- or 6-membered aromatic heterocyclic ring containing up to three heteroatoms selected from nitrogen, oxygen or sulphur;

R<sub>1</sub> is hydrogen or C<sub>1-6</sub> alkyl;

20 R<sub>2</sub>, R<sub>3</sub>, R<sub>10</sub> and R<sub>11</sub> are independently hydrogen or C<sub>1-6</sub> alkyl, or R<sub>10</sub> and R<sub>11</sub> together form a bond, or R<sub>2</sub> and R<sub>10</sub> or R<sub>3</sub> and R<sub>11</sub> together form a C<sub>2-6</sub> alkylene chain;

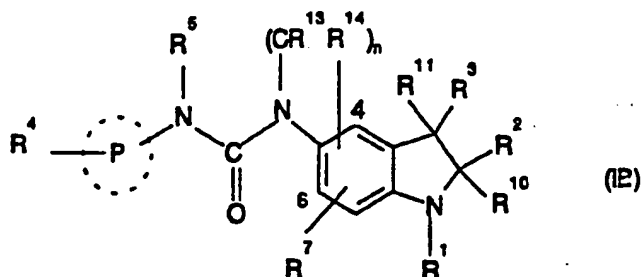
R<sub>4</sub> is hydrogen, C<sub>1-6</sub> alkyl, halogen, NR<sub>8</sub>R<sub>9</sub>, OR<sub>12</sub> or COOR<sub>12</sub>, where R<sub>8</sub>, R<sub>9</sub> and R<sub>12</sub> are independently hydrogen or C<sub>1-6</sub> alkyl;

R<sub>5</sub> and R<sub>6</sub> are independently hydrogen or C<sub>1-6</sub> alkyl; and

25 R<sub>7</sub> is hydrogen, C<sub>1-6</sub> alkyl, C<sub>1-6</sub> alkoxy or halogen; and wherein the urea moiety is attached at the 4-, 5- or 6-position of the indole or indoline ring.

Preferred compounds of formula (IA) include those exemplified in WO 93/18028 and WO 92/05170, in particular N-(1-Methyl-5-indolyl)-N'-(3-methyl-5-isothiazolyl) urea. Compounds of formula (IA) can be prepared according to the procedures outlined in WO 93/18028 and WO 92/05170.

30 Further preferred 5HT<sub>2B</sub> receptor antagonist compounds include those of formula (IB) or pharmaceutically acceptable salts thereof:



wherein:

P represents a quinoline or isoquinoline residue, or a 5- or 6-membered aromatic heterocyclic ring containing up to three heteroatoms selected from nitrogen, oxygen or sulphur;

R<sup>1</sup> is hydrogen or C<sub>1-6</sub> alkyl;

R<sup>2</sup>, R<sup>3</sup>, R<sup>10</sup> and R<sup>11</sup> are independently hydrogen or C<sub>1-6</sub> alkyl, or R<sup>10</sup> and R<sup>11</sup> together form a bond, or R<sup>2</sup> and R<sup>10</sup> or R<sup>3</sup> and R<sup>11</sup> together form a C<sub>2-6</sub> alkylene chain;

R<sup>4</sup> is hydrogen, C<sub>1-6</sub> alkyl, halogen, NR<sup>8</sup>R<sup>9</sup> or OR<sup>12</sup>, where R<sup>8</sup>, R<sup>9</sup> and R<sup>12</sup> are independently hydrogen or C<sub>1-6</sub> alkyl;

R<sup>5</sup> is hydrogen or C<sub>1-6</sub> alkyl;

R<sup>7</sup> is hydrogen, C<sub>1-6</sub> alkyl, OR<sup>12</sup> or halogen, where R<sup>12</sup> is hydrogen or C<sub>1-6</sub> alkyl; and n is 2 or 3; and

the groups R<sup>13</sup> and R<sup>14</sup> are independently hydrogen or C<sub>1-6</sub> alkyl.

Preferred compounds of formula (IB) include:

5-methyl-1-(3-pyridylcarbamoyl)-2,3-dihydropyrrolo[2,3-f]-indole,

6-methyl-3-(5-quinolinylcarbamoyl)-2,3-dihydro-pyrrolo[3,2-e]indole and

N-(5-isoquinolyl)-5-methyl-2,3-dihydropyrrolo[2,3-f] indole-1-carboxamide and pharmaceutically acceptable salts thereof.

Compounds of formula (IB) can be prepared according to the procedure outlined in PCT EP93/02031.

Certain compounds of formula (I), (IA) and (IB) are capable of existing in stereoisomeric forms. It will be understood that the invention encompasses all geometric and optical isomers of these compounds and the mixtures thereof including racemates.

Tautomers of compounds of formula (I), (IA) and (IB) and mixtures thereof will also exhibit 5HT<sub>2B</sub> activity and therefore also form an aspect of the invention.

The compounds of the formula (I), (IA) and (IB) can form acid addition salts with acids, such as conventional pharmaceutically acceptable acids, for example maleic, hydrochloric, hydrobromic, phosphoric, acetic, fumaric, salicylic, citric, lactic, mandelic, tartaric and methanesulphonic.

The present invention further provides a method of treatment or prophylaxis of CNS disorders such as epilepsy, migraine and feeding disorders, and GI disorders such as

IBS, which comprises administering to a host in need thereof an effective amount of a 5HT<sub>2B</sub> receptor modulator or a pharmaceutically acceptable salt thereof.

In a still further aspect, the invention provides the use of a 5HT<sub>2B</sub> receptor modulator or a pharmaceutically acceptable salt thereof in the manufacture of a  
5 medicament for the treatment or prophylaxis of CNS disorders such as epilepsy, migraine and feeding disorders and GI disorders such as IBS.

Compounds which exhibit 5HT<sub>2B</sub> receptor agonist and antagonist activity are also expected to be of use in the treatment and prophylaxis of other CNS disorders. Such disorders include anxiety, depression, obsessive compulsive disorders, pain, memory  
10 disorders such as Alzheimer's disease, sleep disorders, panic attacks, withdrawal from drug abuse such as cocaine, ethanol, nicotine and benzodiazepines, schizophrenia and also disorders associated with spinal trauma and/or head injury such as hydrocephalus.

When used in therapy, the 5HT<sub>2B</sub> receptor agonists and antagonists are usually formulated in a standard pharmaceutical composition. Such compositions can be  
15 prepared using standard procedures.

A pharmaceutical composition of the invention, which may be prepared by admixture, suitably at ambient temperature and atmospheric pressure, is usually adapted for oral, parenteral or rectal administration and, as such, may be in the form of tablets, capsules, oral liquid preparations, powders, granules, lozenges, reconstitutable powders,  
20 injectable or infusible solutions or suspensions or suppositories. Orally administrable compositions are generally preferred.

Tablets and capsules for oral administration may be in unit dose form, and may contain conventional excipients, such as binding agents, fillers, tableting lubricants, disintegrants and acceptable wetting agents. The tablets may be coated according to  
25 methods well known in normal pharmaceutical practice.

Oral liquid preparations may be in the form of, for example, aqueous or oily suspension, solutions, emulsions, syrups or elixirs, or may be in the form of a dry product for reconstitution with water or other suitable vehicle before use. Such liquid preparations may contain conventional additives such as suspending agents, emulsifying agents,  
30 non-aqueous vehicles (which may include edible oils), preservatives, and, if desired, conventional flavourings or colorants.

For parenteral administration, fluid unit dosage forms are prepared utilising a compound of the invention or pharmaceutically acceptable salt thereof and a sterile vehicle. The compound, depending on the vehicle and concentration used, can be either  
35 suspended or dissolved in the vehicle. In preparing solutions, the compound can be dissolved for injection and filter sterilised before filling into a suitable vial or ampoule and sealing. Advantageously, adjuvants such as a local anaesthetic, preservatives and

buffering agents are dissolved in the vehicle. To enhance the stability, the composition can be frozen after filling into the vial and the water removed under vacuum. Parenteral suspensions are prepared in substantially the same manner, except that the compound is suspended in the vehicle instead of being dissolved, and sterilisation cannot be  
5 accomplished by filtration. The compound can be sterilised by exposure to ethylene oxide before suspension in a sterile vehicle. Advantageously, a surfactant or wetting agent is included in the composition to facilitate uniform distribution of the compound.

The composition may contain from 0.1% to 99% by weight, preferably from 10 to 60% by weight, of the active material, depending on the method of administration.

10 The dose of the compound used in the treatment of the aforementioned disorders will vary in the usual way with the seriousness of the disorders, the weight of the sufferer, and other similar factors. However, as a general guide suitable unit doses may be 0.05 to 1000 mg, more suitably 0.05 to 20.0 mg, for example 0.2 to 5 mg; and such unit doses may be administered more than once a day, for example two or three a day, so that the  
15 total daily dosage is in the range of about 0.01 to 100 mg/kg; and such therapy may extend for a number of weeks or months.



**Examples****1-(5-(2-thienylmethoxy)-1H-indol-3-yl)propan-2-amine****5 Description 1****5-Benzyloxy-3-(2-trifluoroacetyl-amino)propylindole (D1)**

Trifluoroacetic anhydride (2.4 ml, 17 mmol) was added to a solution of 3-(2-aminopropyl)-5-benzyloxyindole (prepared by the method of A.S.F. Ash and W.R. Wragg, *J. Chem. Soc.*, 1958, 3887; 4.65g, 16.6 mmol) and 4-(N,N-dimethylamino)pyridine (2.07g, 17 mmol) in dry dichloromethane (40 ml) at 0° C. The mixture was stirred for 1h at 0° C, then washed twice with water, dried and evaporated. The residue was chromatographed on silica gel eluted with 1-2% methanol/dichloromethane. Eluted product was recrystallised from dichloromethane/petrol to give the title compound (3.71g, 59%).

NMR (CDCl<sub>3</sub>) δ : 1.23 (3H, d, J = 7), 2.46 (2H, m), 4.38 (1H, m), 5.11 (2H, s), 6.23 (1H, d, J = 7), 6.97 (2H, m), 7.13 (1H, d, J = 2), 7.30 (1H, d, J = 7), 7.38 (3H, m), 7.49 (2H, m), 8.03 (1H, s).

MS (EI) m/e 376 (M<sup>+</sup>)

**Description 2****5-Hydroxy-3-(2-trifluoroacetyl-amino)propylindole (D2)**

Benzyloxyindole (D1, 3.7g, 9.8 mmol) was shaken with 5% palladium on charcoal (0.47g) in ethanol (50 ml) under hydrogen at 50 p.s.i., for 43h. The mixture was filtered through kieselguhr and the filtrate was evaporated. The residue was chromatographed on silica gel eluted with 2% methanol/dichloromethane. Eluted product was recrystallised from dichloromethane/methanol to give the title compound (2.22g, 79%)

NMR (CDCl<sub>3</sub>/CD<sub>3</sub>OD) δ : 1.22 (3H, d, J = 7), 2.83 (1H, dd, J = 14,7), 3.00 (1H, dd, J = 14,5), 4.34 (1H, m), 6.82 (1H, dd, J = 7,2), 6.99 (1H, s), 7.08 (1H, d, J = 2), 7.22 (1H, d, J = 7), 8.28 (1H, s).

**Description 3****5-(2-thienylmethoxy)-3-(2-trifluoroacetylamino)indole (D3)**

A solution of hydroxyindole (D2, 2.22g, 7.76 mmol) in dry dimethylformamide (15 ml) was added to a suspension of sodium hydride (80% in oil, 0.28g, 9.3 mmol) in dimethylformamide (15 ml) at 0° C. After 10 min at 0° C a solution of 2-chloromethylthiophene (1.06g, 8 mmol) in dimethylformamide (10 ml) was added and the mixture was heated for 2h at 90-110° C. The mixture was then evaporated and the residue was dissolved in dichloromethane and washed with dilute hydrochloride acid (pH3), sodium bicarbonate and water. The organic phase was dried and evaporated, and the residue was chromatographed on silica gel with 1-2% methanol/dichloromethane, to give the title compound (1.87g, 63%).

NMR (CDCl<sub>3</sub>) δ : 1.26 (3H, d, J = 7), 2.98 (2H, m), 4.38 (1H, m), 5.28 (2H, s), 6.22 (1H, d, J = 7), 6.95 (1H, dd, J = 7,2), 7.00 (2H, m), 7.13 (1H, d, J = 4), 7.18 (1H, d, J = 2), 7.29 (1H, d, J = 7), 7.34 (1H, d, J = 6), 8.05 (1H, s).

MS (EI) m/e 382 (M<sup>+</sup>)

**20 Example 1****1-[5-(2-Thienylmethoxy)-1H-indol-3-yl]propan-2-amine hydrochloride (E1)**

The trifluoroacetyl compound (D3, 1.86g, 4.87 mmol) was heated under reflux with potassium carbonate (3.82g, 27.7 mmol) in methanol (90 ml) and water (6 ml) for 6.5h. The mixture was partially evaporated and then partitioned between dichloromethane and water. The aqueous phase was further extracted with dichloromethane. Combined organic phases were washed with brine, dried and evaporated. The crude product (1.39g) was dissolved in ethyl acetate (50 ml) at 0° C and 1M hydrogen chloride/ether (4.9ml, 4.9 mmol) was added slowly. After stirring for 5 min at 0° C, the precipitate was filtered off, washed with ethyl acetate and dried, to give the title compound (1.40g, 89%), m.p. 203-205° C.

NMR (d<sub>6</sub>-DMSO) δ : 1.19 (3H, d, J = 7), 2.80 (1H, dd, J = 14, 7), 3.09 (1H, dd, J = 14, 5), 5.31 (2H, s), 6.80 (1H, dd, J = 7,2), 7.03 (1H, dd, J = 6, 4), 7.20-7.31 (4H, m), 7.54 (1H, d, J = 6), 8.01 (1H, s).

MS (CI) m/e 287 (MH<sup>+</sup>)

## Pharmacological Data

### Epilepsy

5

5HT<sub>2B</sub> receptor agonists are expected to be of use in the treatment of epilepsy since 1-(5-(2-thienylmethoxy)-1H-indol-3yl-)propan-2-amine (1-100 mgkg<sup>-1</sup> s.c. 30 min pretest) significantly raised the current at which 50% of mice convulsed in the mouse maximal electroshock seizure (MES) threshold test, carried out as described in Loscher and Schmidt, (1988, *Epilepsy Res.*, 2, 145-181). This is consistent with the presence of 5HT<sub>2B</sub> receptor mRNA in the rat hippocampus, an area which can mediate convulsions (McNamara et al., 1993, in *Epilepsy, models, mechanisms and concepts*, Ed, Schwartzkroin, Cambridge University Press, pp 27-47).

15 IBS

5HT<sub>2B</sub> receptors are expressed in the stomach fundus of the rat (Foguet et al., 1992, *EMBO J.*, 11, 3481-3487) where they mediate a contractile response to 5-hydroxytryptamine (5-HT). 1-(5-(2-thienylmethoxy)-1H-indol-3yl-)propan-2-amine also causes contraction of rat stomach fundus and is a selective agonist at 5HT<sub>2B</sub> receptors in this preparation (pEC<sub>50</sub>[95% Confidence limits] = 8.47 [8.04 - 8.90]).

In bilaterally vagotomised spinal rats, 1-(5-(2-thienylmethoxy)-1H-indol-3yl-)propan-2-amine (1-100 µgkg<sup>-1</sup> i.v.) evokes a dose-dependant and significant increase in gastric motility in vivo causing a significant increase in intragastric pressure (for methodology see Dhasmana et al., 1992, *Eur. J. Pharmacol.*, 213, 293-299). This action is blocked by selective 5HT<sub>2B</sub> receptor antagonists such as those disclosed in Patent (WO 93/18028) and supports a use for 5HT<sub>2B</sub> receptor modulators in disorders of gastric motility. Such a use is further supported by the observation that the 5HT<sub>2B</sub> receptor antagonist 6-methyl-3-(5-quinolinylcarbonyl)-2,3-dihydro-pyrrolo[3,2-e]indole (10 - 10000 µgkg<sup>-1</sup> s.c.) significantly reduced 5-hydroxytryptophan-induced increase in faecal pellet output in the conscious mouse (for methods see Banner et al., 1993, *Br. J. Pharmacol.*, 110, 17P).

### Feeding Disorders

35

When given at doses between 1 and 100 mgkg<sup>-1</sup> s.c. 30 min pretest, or at doses between 1 and 30 µg i.c.v. 4 min pretest, 1-(5-(2-thienylmethoxy)-1H-indol-3yl-)propan-2-amine

significantly increases feeding behaviour and food intake in freely-feeding, sated rats. The methodology used in these studies was as described in Kennett et al., (1992, Eur. J. Pharmacol., 141, 429-435). Thus 5HT<sub>2B</sub> receptor agonists are expected to be of therapeutic use in the treatment of feeding disorders such as anorexia nervosa and bulimia. Furthermore, selective 5HT<sub>2B</sub> receptor antagonists are likely to have appetite suppressant actions and be beneficial in the treatment of obesity. These claims are supported by the presence of high levels of 5HT<sub>2B</sub> receptor mRNA in the hypothalamus (studies carried out at SmithKline Beecham Pharmaceuticals), an area long associated with the control of appetite (Sugrue et al., 1987, Neuropharmacology, 32, 145-182).

10

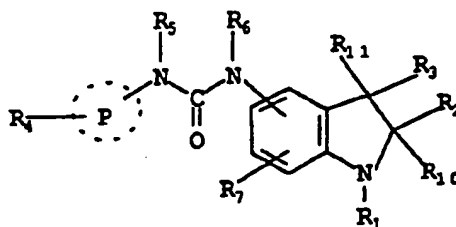
### Migraine

1-(5-(2-thienylmethoxy)-1H-indol-3-yl-)propan-2-amine (mean pEC<sub>50</sub> [95% C.L.] 7.9 [7.7 - 8.1] with an intrinsic activity (IA) of 0.84 + 0.04, n=9) and 5-HT (mean pEC<sub>50</sub> [95% C.L.] 8.2 [8.0 - 8.3] IA 1.0, n=9) evokes endothelium-dependant relaxation of isolated rat jugular vein via activation of 5HT<sub>2B</sub> receptors with a maximal relaxation to 5HT of 73.8 + 4.6%, n=9 (for basic methods see Bodelsson et al., 1993, J. Pharm. Exp. Ther., 264, 709 - 716). Endothelium-dependant 5HT-induced relaxation of isolated smooth muscle preparations has been suggested to be due to release of endothelium derived nitric oxide (Martin et al., 1992, Br. J. Pharmacol., 105, 643 - 652). Local application of 5HT to cerebral arterioles in vivo induces dilatation which is antagonised by inhibitors of nitric oxide synthase (Parsons et al., 1992, In: 5-Hydroxytryptamine mechanisms in primary headaches, Ed. Olesen & Saxena, Raven Press, NY, pp157 - 162) suggesting the presence of cerebrovascular 5HT<sub>2B</sub> receptors. Furthermore the pharmacological character of the receptor mediating the dilation is that expected for 5HT<sub>2B</sub>. Agonist potency order  $\alpha$ -methyl 5HT = 5HT > 5CT. (Pryke et al., Brit. J. Pharmacol. 1989, 98, 685p). Dilatation of cerebral arteries has been shown to induce a migraine-like headache (Nichols et al., 1991, Stroke, 21, 555 - 559). 5HT<sub>2B</sub> receptor modulators are therefore expected to be effective in the treatment or prophylaxis of migraine.

25

## CLAIMS:

1. Use of a 5HT<sub>2B</sub> receptor antagonist for the treatment of migraine.
2. Use according to claim 1 in which the 5HT<sub>2B</sub> receptor antagonist is a compound of formula (IA) or a pharmaceutically acceptable salt thereof:



(IA)

10

wherein:

P represents a quinoline or isoquinoline residue or a 5- or 6-membered aromatic heterocyclic ring containing up to three heteroatoms selected from nitrogen, oxygen or sulphur;

15 R<sub>1</sub> is hydrogen or C<sub>1-6</sub> alkyl;

R<sub>2</sub>, R<sub>3</sub>, R<sub>10</sub> and R<sub>11</sub> are independently hydrogen or C<sub>1-6</sub> alkyl, or R<sub>10</sub> and R<sub>11</sub> together form a bond, or R<sub>2</sub> and R<sub>10</sub> or R<sub>3</sub> and R<sub>11</sub> together form a C<sub>2-6</sub> alkylene chain;

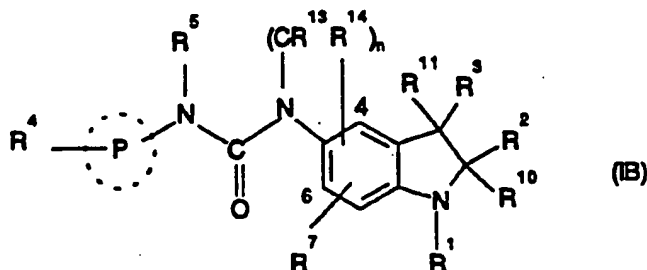
R<sub>4</sub> is hydrogen, C<sub>1-6</sub> alkyl, halogen, NR<sub>8</sub>R<sub>9</sub>, OR<sub>12</sub> or COOR<sub>12</sub>, where R<sub>8</sub>, R<sub>9</sub> and R<sub>12</sub> are independently hydrogen or C<sub>1-6</sub> alkyl;

20 R<sub>5</sub> and R<sub>6</sub> are independently hydrogen or C<sub>1-6</sub> alkyl; and

R<sub>7</sub> is hydrogen, C<sub>1-6</sub> alkyl, C<sub>1-6</sub> alkoxy or halogen; and wherein the urea moiety is attached at the 4-, 5- or 6-position of the indole or indoline ring.

3. Use according to claim 1 in which the 5HT<sub>2B</sub> receptor antagonist is a compound of formula (IB) or a pharmaceutically acceptable salt thereof:

25



(IB)

wherein:

P represents a quinoline or isoquinoline residue, or a 5- or 6-membered aromatic

heterocyclic ring containing up to three heteroatoms selected from nitrogen, oxygen or sulphur;

$R^1$  is hydrogen or  $C_{1-6}$  alkyl;

$R^2$ ,  $R^3$ ,  $R^{10}$  and  $R^{11}$  are independently hydrogen or  $C_{1-6}$  alkyl, or  $R^{10}$  and  $R^{11}$  together form a bond, or  $R^2$  and  $R^{10}$  or  $R^3$  and  $R^{11}$  together form a  $C_{2-6}$  alkylene chain;

$R^4$  is hydrogen,  $C_{1-6}$  alkyl, halogen,  $NR^8R^9$  or  $OR^{12}$ , where  $R^8$ ,  $R^9$  and  $R^{12}$  are independently hydrogen or  $C_{1-6}$  alkyl;

$R^5$  is hydrogen or  $C_{1-6}$  alkyl;

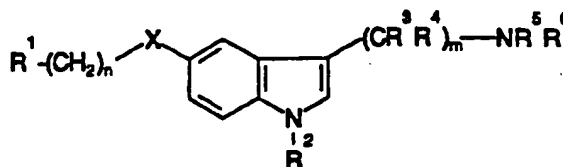
$R^7$  is hydrogen,  $C_{1-6}$  alkyl,  $OR^{12}$  or halogen, where  $R^{12}$  is hydrogen or  $C_{1-6}$  alkyl; and  $n$  is 2 or 3; and

the groups  $R^{13}$  and  $R^{14}$  are independently hydrogen or  $C_{1-6}$  alkyl.

4. Use according to claim 3 in which the compound of formula (IB) is 5-methyl-1-(3-pyridylcarbonyl)-2,3-dihydropyrrolo[2,3-f]indole, 6-methyl-3-(5-quinolylcarbonyl)-2,3-dihydro-pyrrolo[3,2-e]indole, or N-(5-isoquinolyl)-5-methyl-2,3-dihydropyrrolo[2,3-f] indole-1-carboxamide or pharmaceutically acceptable salts thereof.

5. Use of a  $5HT_{2B}$  receptor agonist in the treatment of epilepsy and feeding disorders.

6. Use according to claim 5 in which the  $5HT_{2B}$  receptor agonist is a compound of formula (I) and pharmaceutically acceptable salts thereof:



(I)

25 in which

$R^1$  is an optionally substituted phenyl, thienyl or furyl ring;

$R^2$  is hydrogen or  $C_{1-6}$  alkyl;

$R^3$  and  $R^4$  are independently hydrogen or  $C_{1-6}$  alkyl;

$R^5$  and  $R^6$  are independently hydrogen or  $C_{1-6}$  alkyl;

30 X is O, S or NH; and

$n$  and  $m$  are independently 1 or 2.

7. Use according to claim 6 in which the  $5HT_{2B}$  receptor agonist is 1-(5-(2-thienylmethoxy)-1H-indol-3-yl)propan-2-amine or a pharmaceutically acceptable salt thereof.